NOGALES EARLY FLOOD WARNING AND HYDROLOGIC MODELING SYSTEM

U.S. Geological Survey (USGS) - US Northern Command

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Characterizing and Mitigating Hazardous Flood Potential Resulting from Climate Change in the Arid Southwestern North America

Contact: Floyd Gray, USGS
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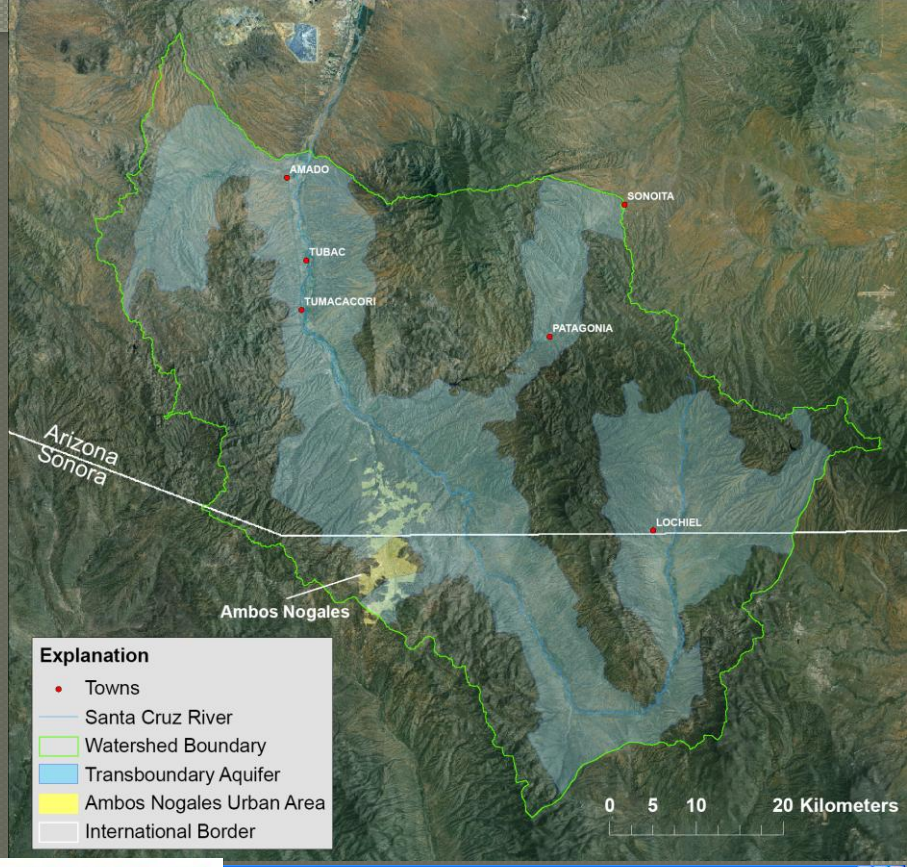
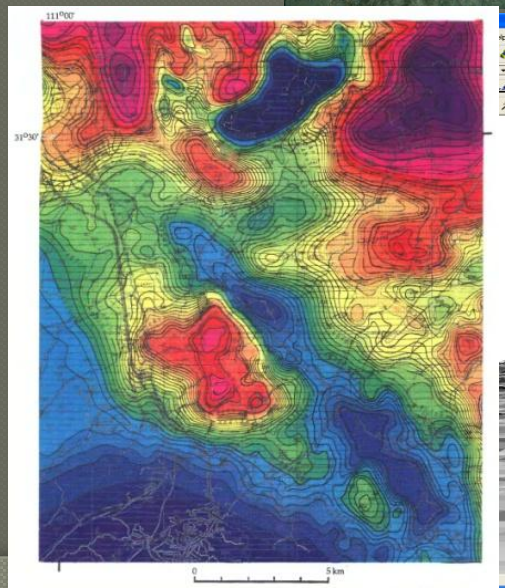
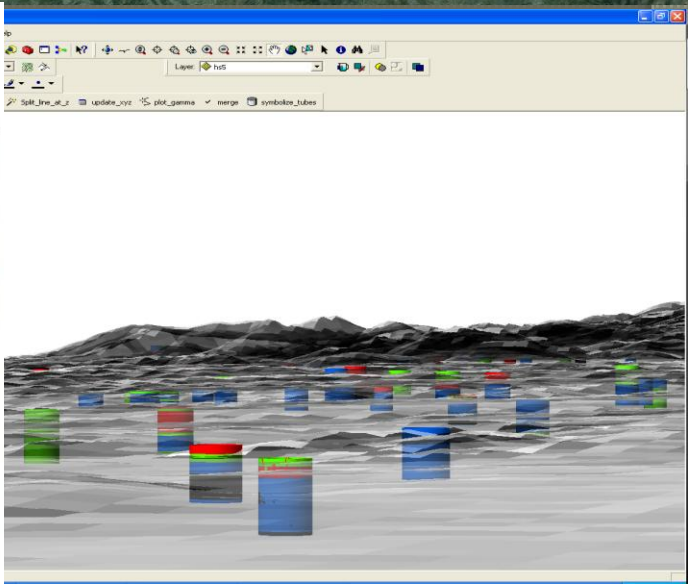
Hydrogeologic Framework

- Working in concert with USGS Transboundary Aquifers Program
- Database of > 1000 well logs
- Delineation of alluvial aquifer from maps of surficial geology
- Using airborne electromagnetic and other geophysical data to develop 3D understanding of grain size distribution in the alluvium as well as depth to bedrock
- Important for understanding groundwater-surface water interactions and contaminant transport
- Border Environmental Health







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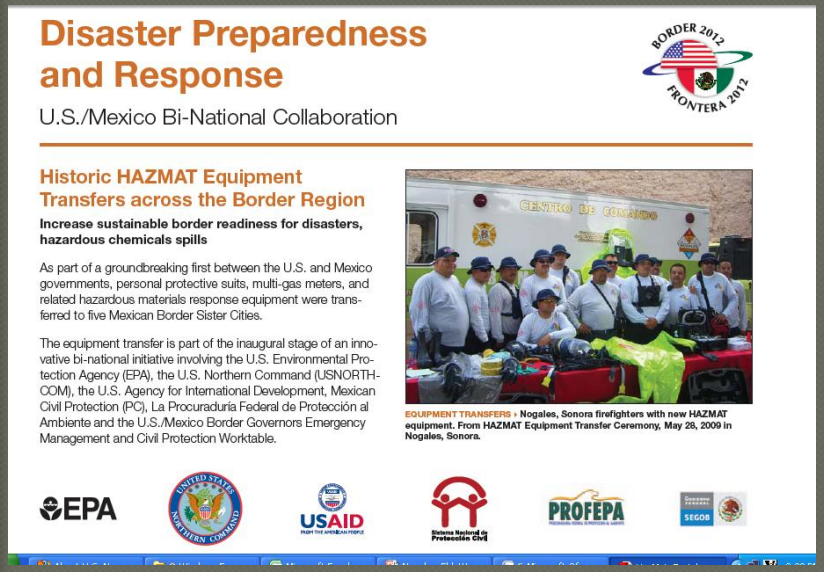
Before…With the exception of NORAD, Americans began to view the military as assets to defend U.S. interests in distant lands and no longer the U.S. shores. Wars broke out throughout the world.

Now…Homeland defense has come full circle as a result of the attacks of September 11, 2001. While the threats to America have evolved and changed, the military has again been tasked "to provide for calling forth the militia to execute the laws of the union, suppress insurrections, and repel invasions," per Article 1, Section 8, Clause 15, of the Constitution of the United States.

After the events of Sept. 11, 2001, and as authorized by President George W. Bush, the Department of Defense established U.S. Northern Command to consolidate under a single unified command those existing homeland defense and civil support missions that were previously executed by other military organizations. USNORTHCOM attained initial operational capability on Oct. 1, 2002, and full operational capability on Sept. 11, 2003.

NorthCom foreign aid
Hemispheric
Humanitarian Aid Program



Disaster Preparedness and Response

U.S./Mexico Bi-National Collaboration

Historic HAZMAT Equipment Transfers across the Border Region

Increase sustainable border readiness for disasters, hazardous chemicals spills

As part of a groundbreaking first between the U.S. and Mexico governments, personal protective suits, multi-gas meters, and related hazardous materials response equipment were transferred to five Mexican Border Sister Cities.

The equipment transfer is part of the inaugural stage of an innovative bi-national initiative involving the U.S. Environmental Protection Agency (EPA), the U.S. Northern Command (USNORTHCOM), the U.S. Agency for International Development, Mexican Civil Protection (PC), La Procuraduría Federal de Protección al Ambiente and the U.S./Mexico Border Governors Emergency Management and Civil Protection Worktable.

EQUIPMENT TRANSFERS › Nogales, Sonora firefighters with new HAZMAT equipment. From HAZMAT Equipment Transfer Ceremony, May 28, 2009 in Nogales, Sonora.

EPA USAID PROFEPA SEGOB

USNORTHCOM donation sends flood relief to Mexico

By Staff Sgt. Thomas J. Doscher
NORAD and USNORTHCOM Public Affairs
July 27, 2010

PETERSON AIR FORCE BASE, Colo. - A U.S. Northern Command donation through a special humanitarian assistance program managed in the Interagency Coordination Directorate resulted in the funding of a 23,000 gallon-per-hour pump to help flood clean-up efforts in Matamoros, Mexico, in the aftermath of Hurricane Alex.
.

The donation shows U.S. solidarity with the people of Matamoros in their time of crisis, said Consul General Michael Barkin. The pumps, he added, not only helped the people of Matamoros but also helped the Consulate demonstrate its ability to help during times of strife.

"It was the kind of good publicity money can't buy and will be extremely helpful to us as we represent the U.S. here at the border," he said.

The humanitarian assistance program brings together USNORTHCOM and its interagency partners to improve disaster preparedness and community resiliency in Mexico and The Bahamas.

"This program allows us to help our neighbors develop and improve their ability to respond to catastrophic events such as pandemic outbreaks, hazardous material releases and natural disasters," said Robert Mackay, USNORTHCOM Interagency Coordination Directorate Humanitarian Assistance Branch chief. "With the help of our colleagues in the Consulate, we had a $2,800 piece of equipment pumping water out of an inundated city within three hours from the initial request."

USNORTHCOM has completed seven humanitarian assistance projects in Mexico and The Bahamas since the program started in 2007 with more than 30 others currently being planned.

"This program is about helping our neighbors," Mackay said. "That is the essence of USNORTHCOM's humanitarian assistance program."

This program fulfills numerous U.S. and Mexican objectives, including:

- DOD's Integrated Homeland Security mission
- Border 2012 Goal to "Enhance Joint Readiness for Environmental Response"
- Mexico Federal Civil Protection Five Year Plan to Strengthen Preparedness and Response Capability
- Border Governors Emergency Management and Civil Protection Worktable Five Year Plan

I. Preliminary Project Organization and Sequencing

II. Climate Precip Data Collection Systems

III. Preliminary Model Development

IV. Quantitative Parameterization of Models

V. Stream Gage Recon
Physical placement-site suitability

VI. Network Operation
Sensitivity analysis

VII. Technology Transfer/ Community Education/ Alert Issuance

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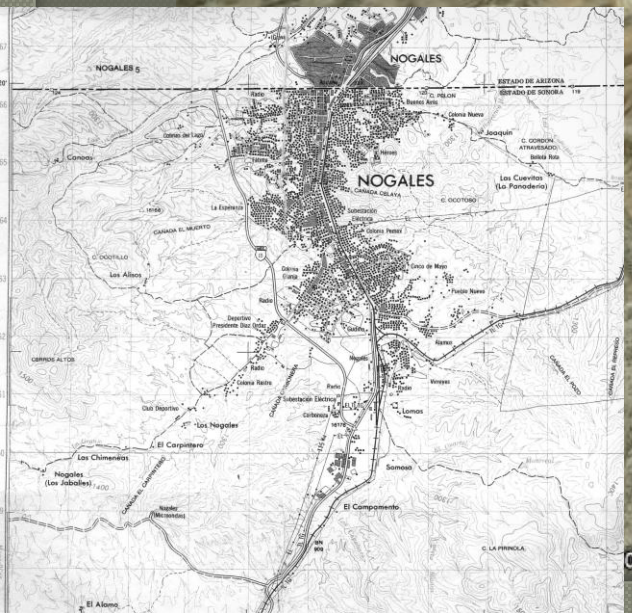
AMBOS NOGALES



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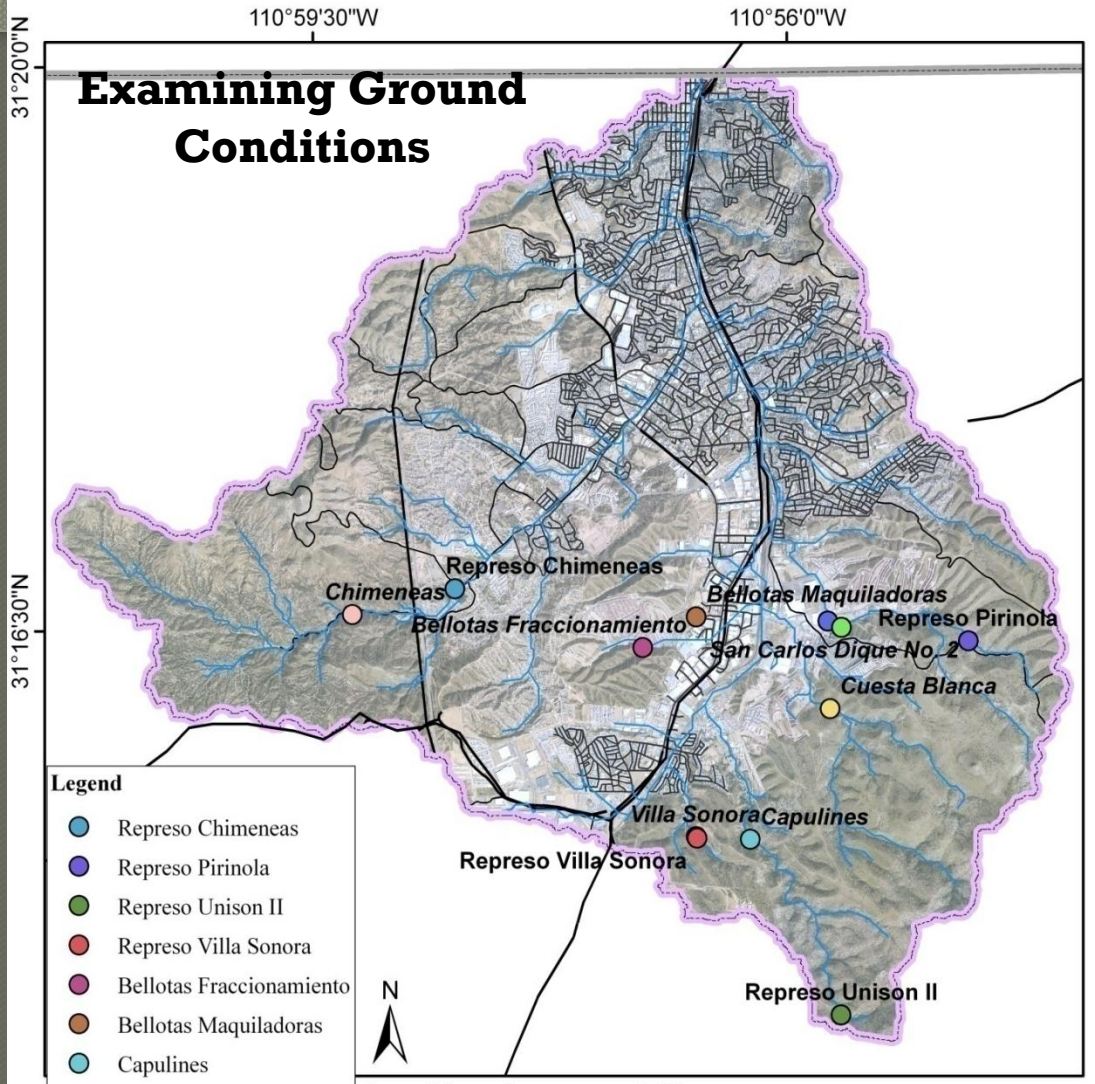
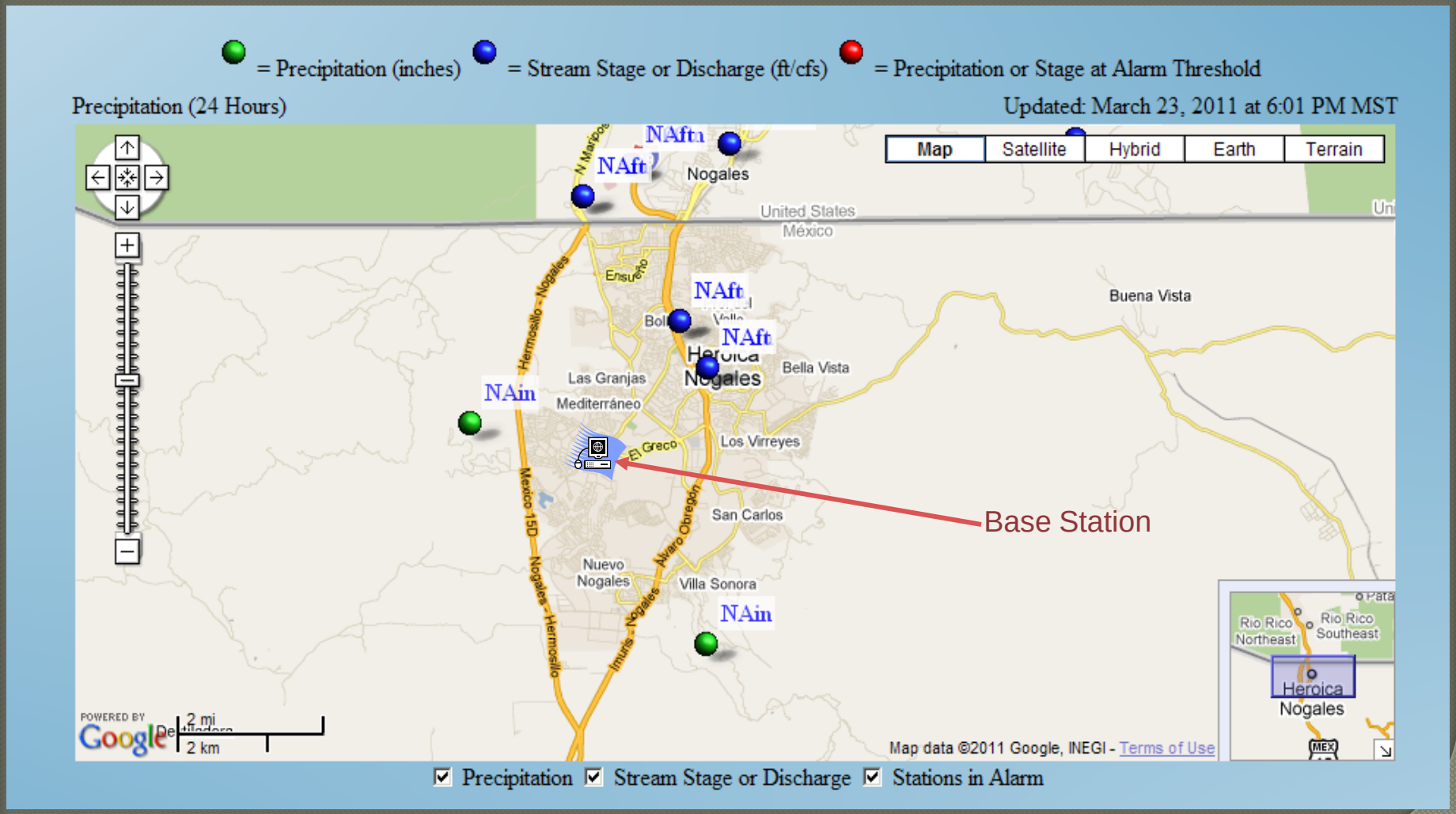
Examining Ground Conditions



Legend

- Represo Chimeneas
- Represo Pirinola
- Represo Unison II
- Represo Villa Sonora
- Bellotas Fraccionamiento
- Bellotas Maquiladoras
- Capulines
- Chimeneas
- Cuesta Blanca
- San Carlos Dique No. 1
- San Carlos Dique No. 2
- Villa Sonora
- International Border
- Tributaries
- Roads
- Sub-Watershed Boundary

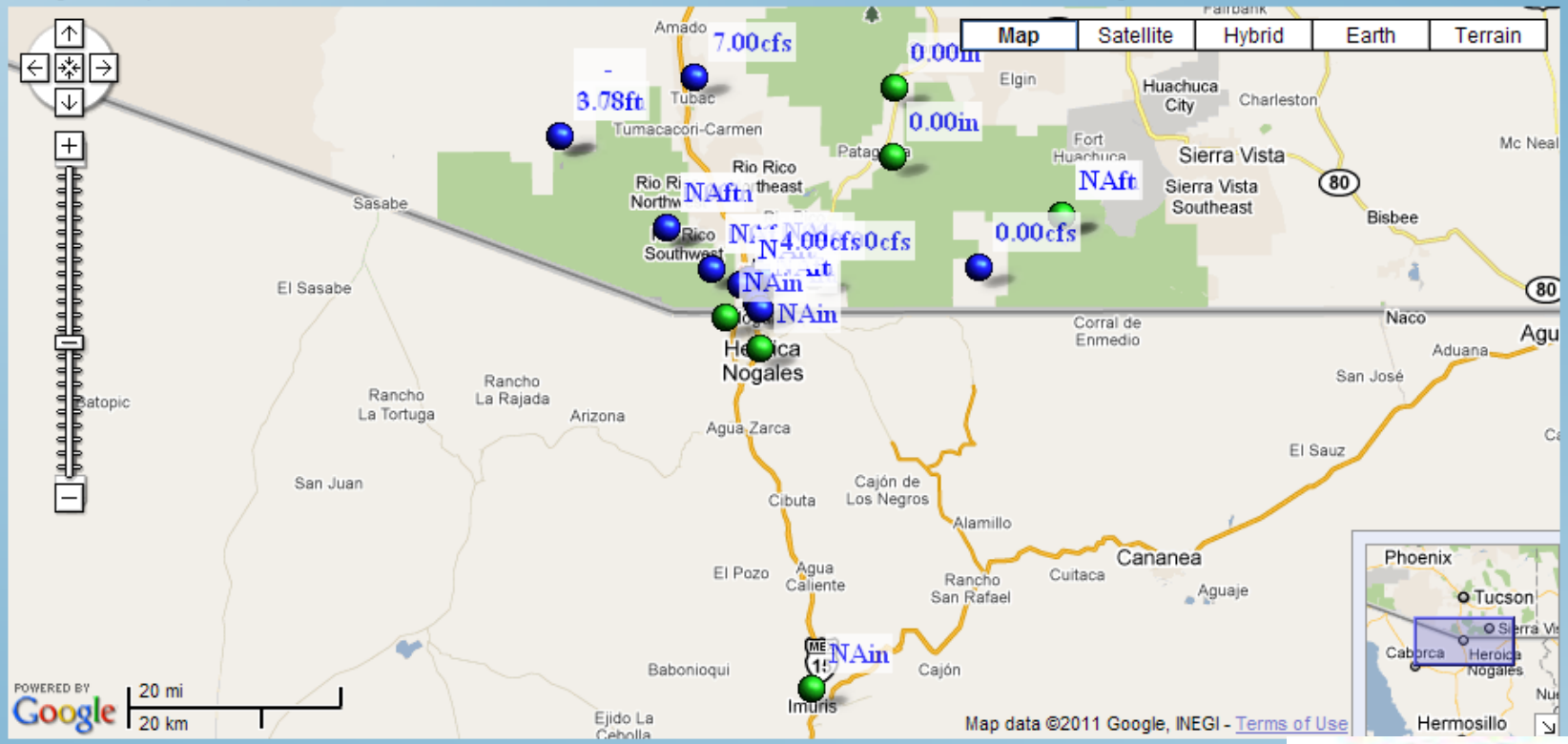
Major Instrumentation Sites of the Nogales Flood Warning and Modeling Project



Nogales, Arizona/Sonora ALERT System
---- PROVISIONAL DATA SUBJECT TO REVISION ----

= Precipitation (inches) = Stream Stage or Discharge (ft/cfs) = Precipitation or Stage at Alarm Threshold

Precipitation (24 Hours) Updated: March 23, 2011 at 5:51 PM MST



Precipitation Stream Stage or Discharge Stations in Alarm

Span of Instrumentation Sites Including Imuris Weather Station (South)

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Nogales Instrument Configuration

Stream Gauge-Chimenea/Hospital

Stream Gauge #2-Nogales

Nogales

Weather Station #1

Base Station

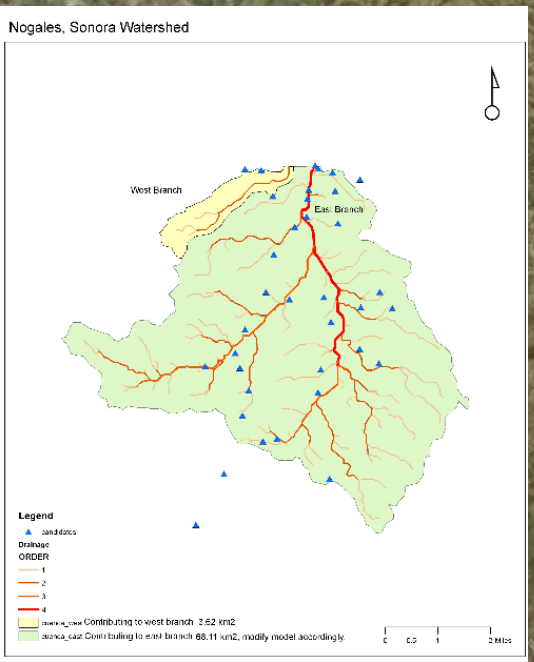
Imuris Weather station

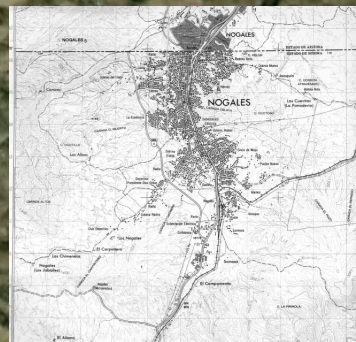
Weather Station-COBACHI

Nogales

Nogales

Nogales, Sonora Watershed





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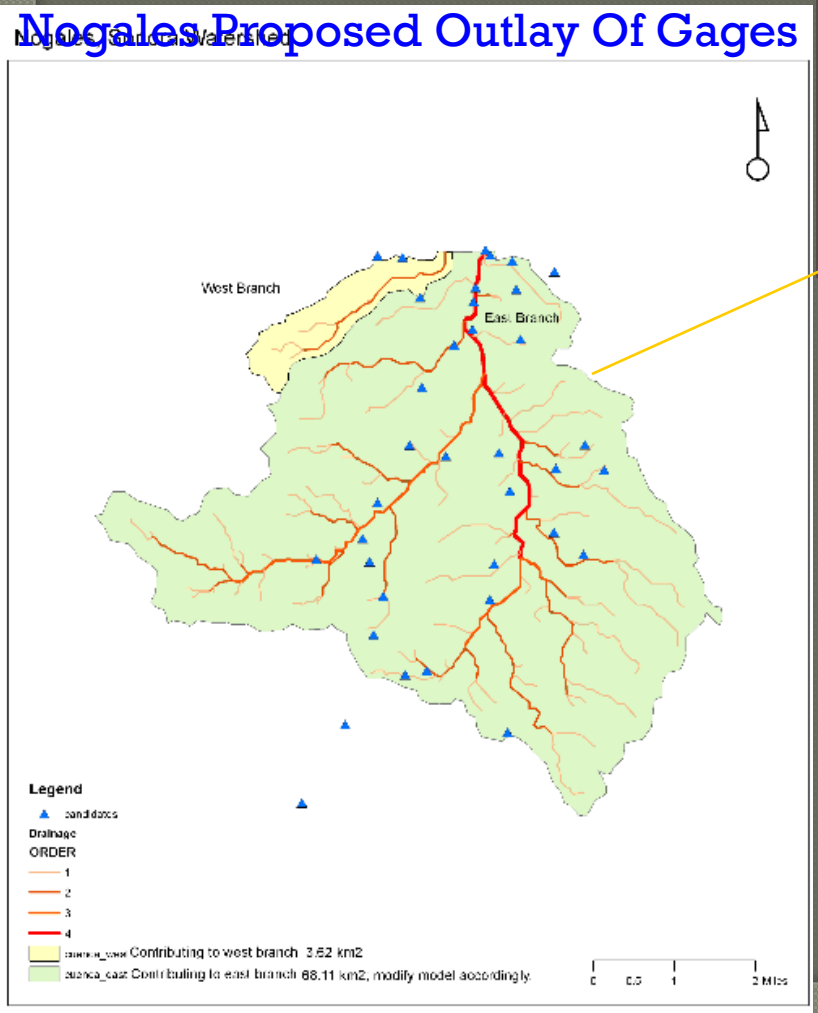
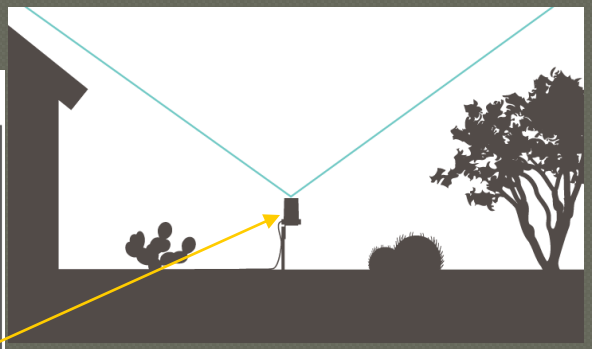
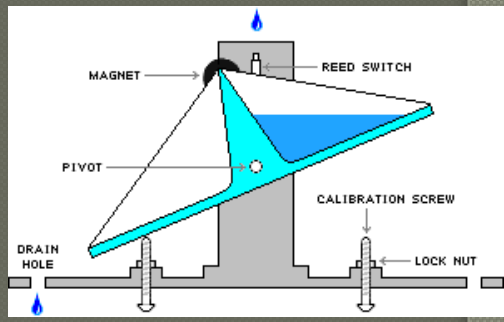
Rain Gage Network
Tipping Bucket Rain Gage

Nogales Proposed Outlay Of Gages

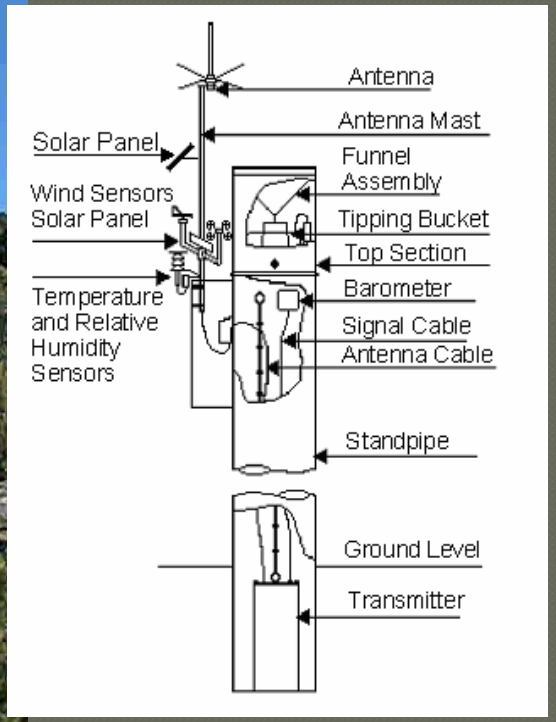






Climate Data Collection Systems

MODEL 5081 : Self-Reporting Weather Station



The Model 5081 Self-Reporting Weather Station automatically reports weather data to a central site. Data transmitted from Model 5081 sites will be used for quantitative determinations of oncoming storms and establishing data bases for flood alert and flood control programs. The Weather Station consists of wind, temperature, humidity, barometric pressure and precipitation sensors, a Model 5096-81 transmitter, a solar panel, interconnection cables and omni antenna. The Model 5096-81 Data Transmitter sends data on both event and timed modes as defined by the "Plug and Play" default parameter set.

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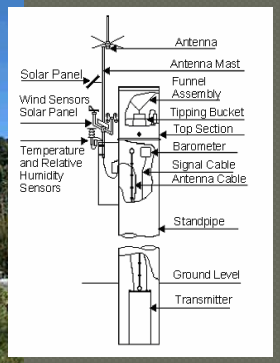
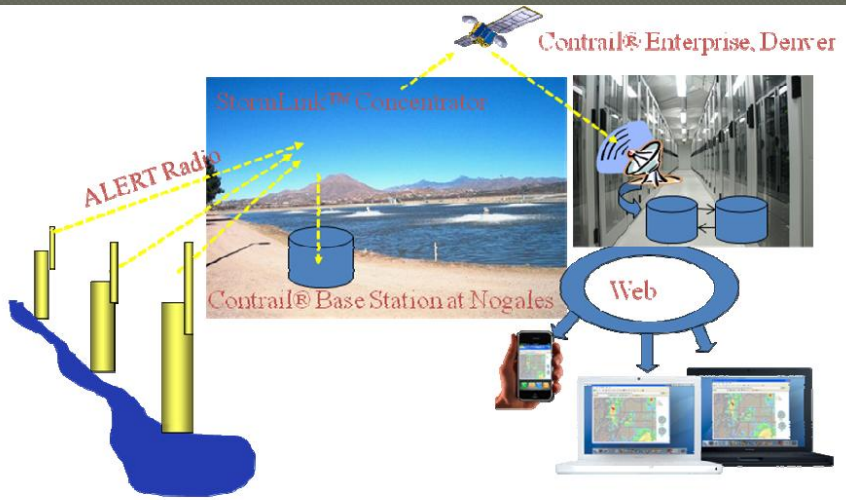
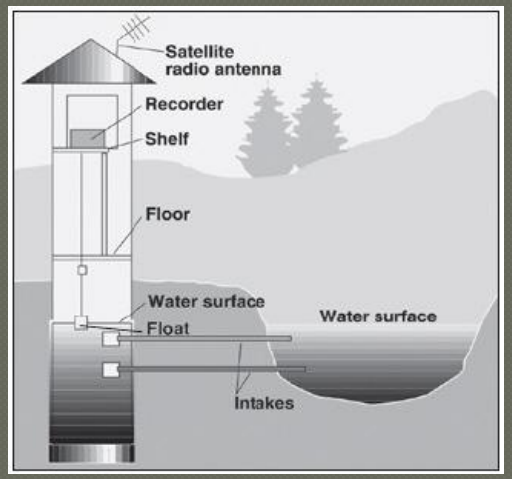
DATA TRANSMISSION



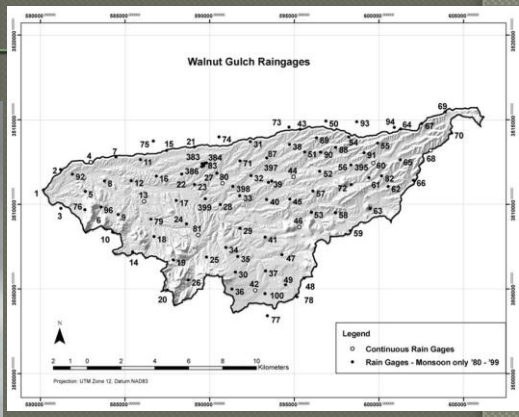


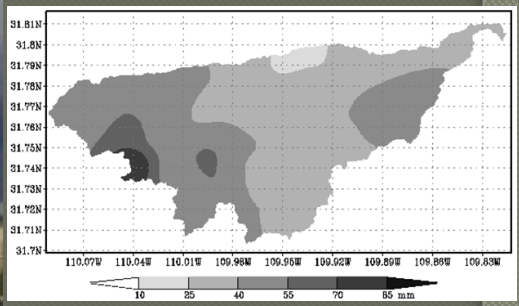
Descriptions of the four project components: Contrail® Base Station, StormLink™ Satellite ALERT Concentrator, Contrail® Web and Training are detailed below.

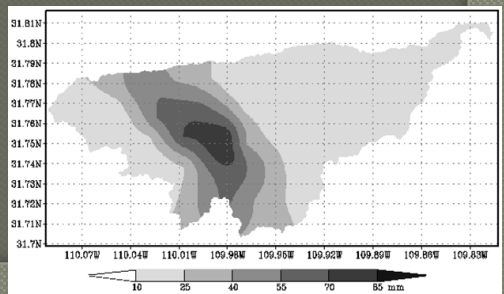


Land surface models (LSMs) of hydrological processes

Based on accurate precipitation recordings using a dense surface precipitation gage network **and land-base processes data input**







Cortesía de la Municipalidad de Nogales, Sonora

Kineros Runoff and Erosion Model Watershed Modeling System(WMS)

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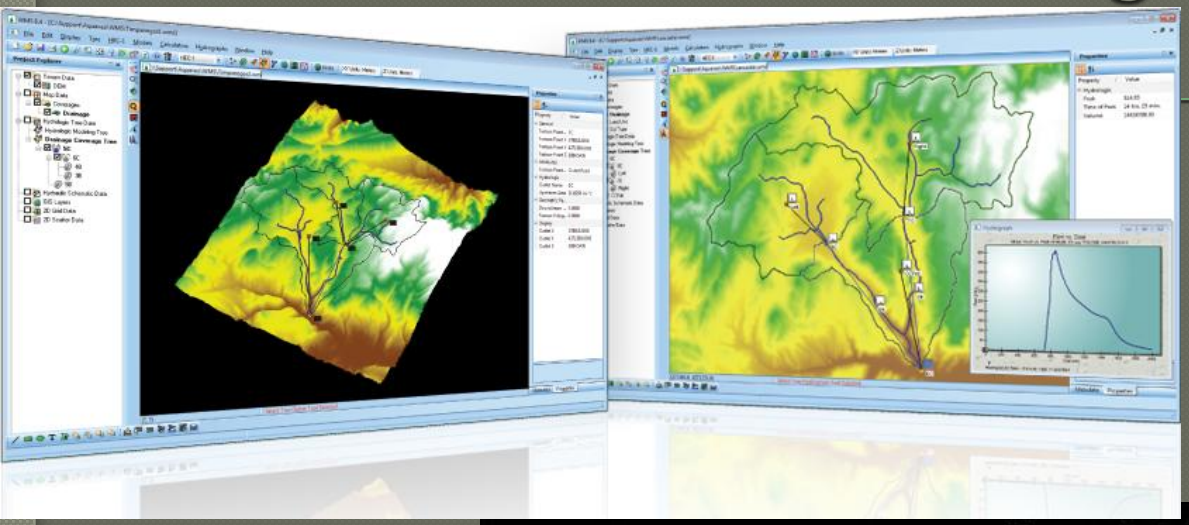

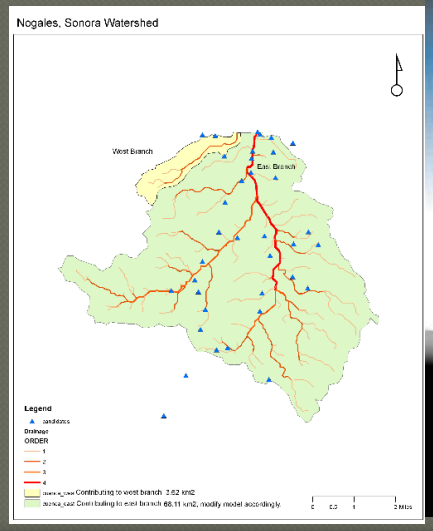

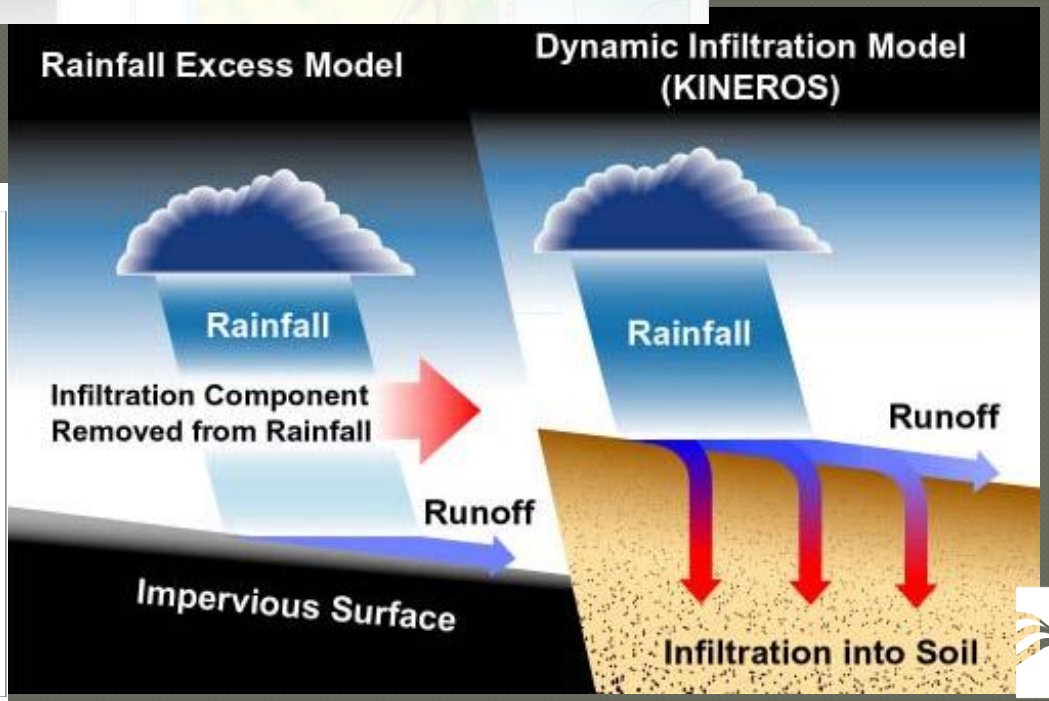

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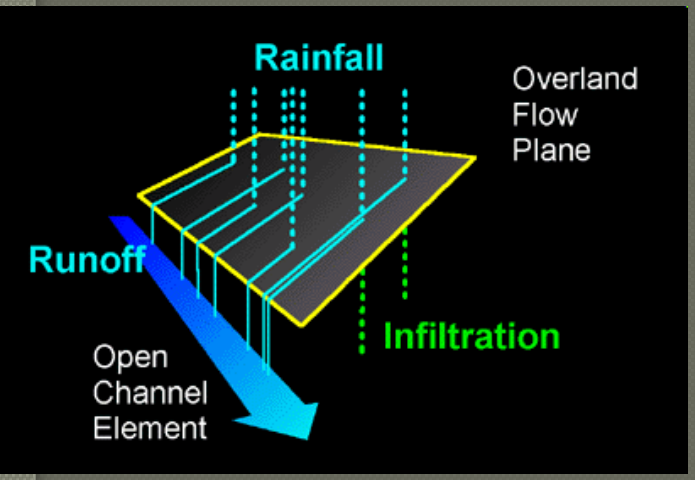
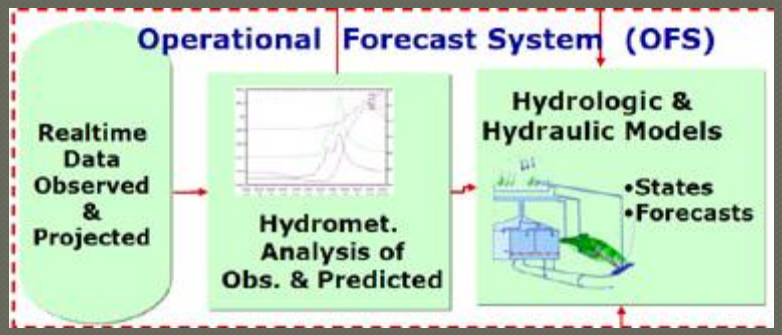
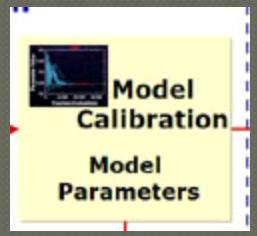
IV. Quantitative Parameterization of Models

KINEROS2
A KINEMATIC RUNOFF AND EROSION MODEL



Stream Gage Placement





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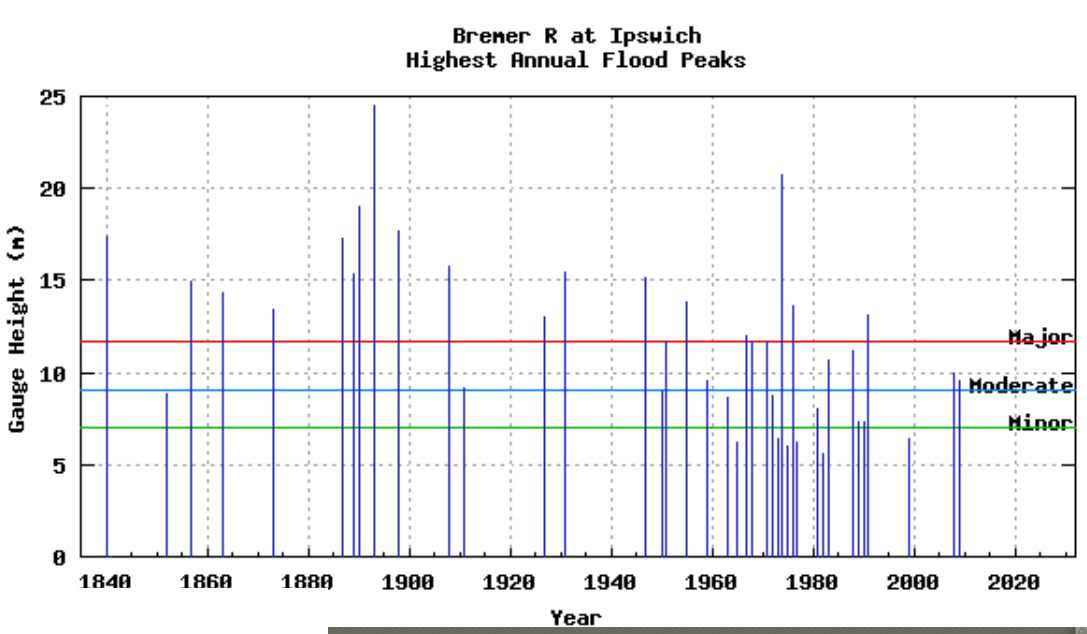
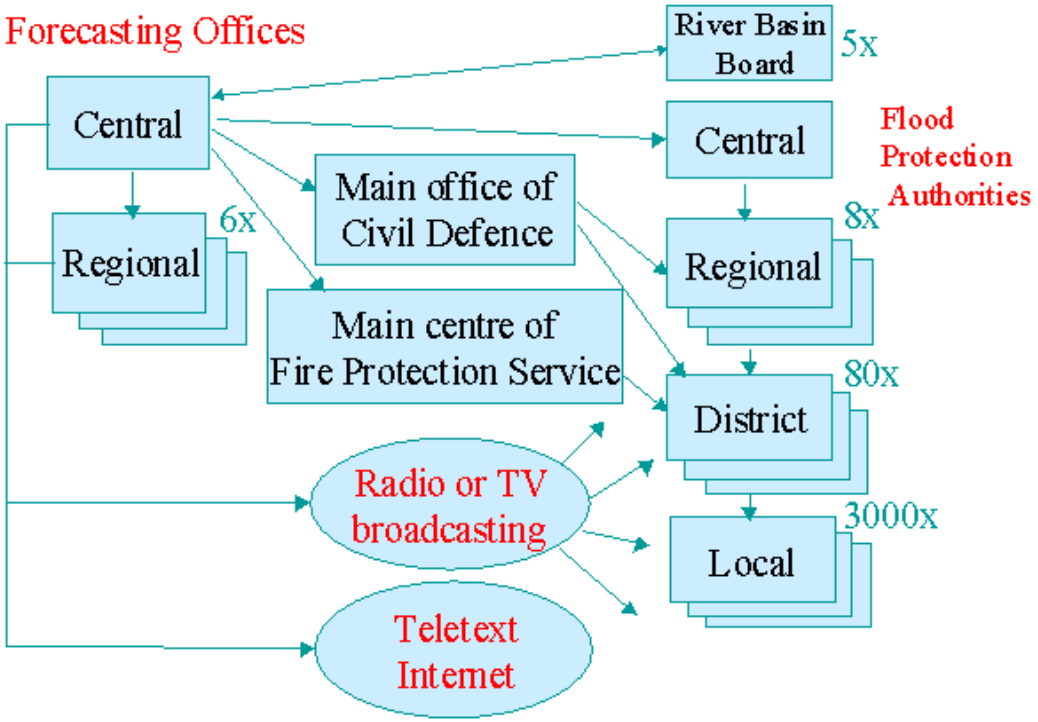
VII. Technology Transfer/ Community Education/ Alert Issuance

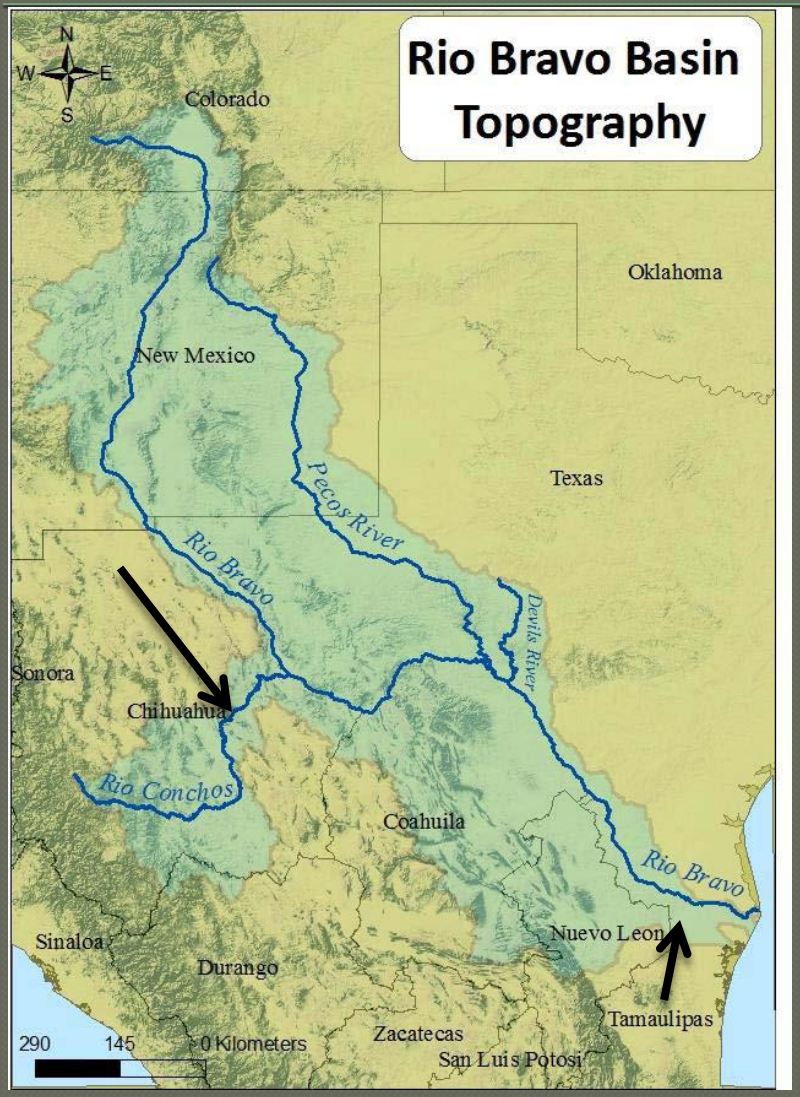


Flood forecasting and warning system



Anthropology of strategies
Communicating science data

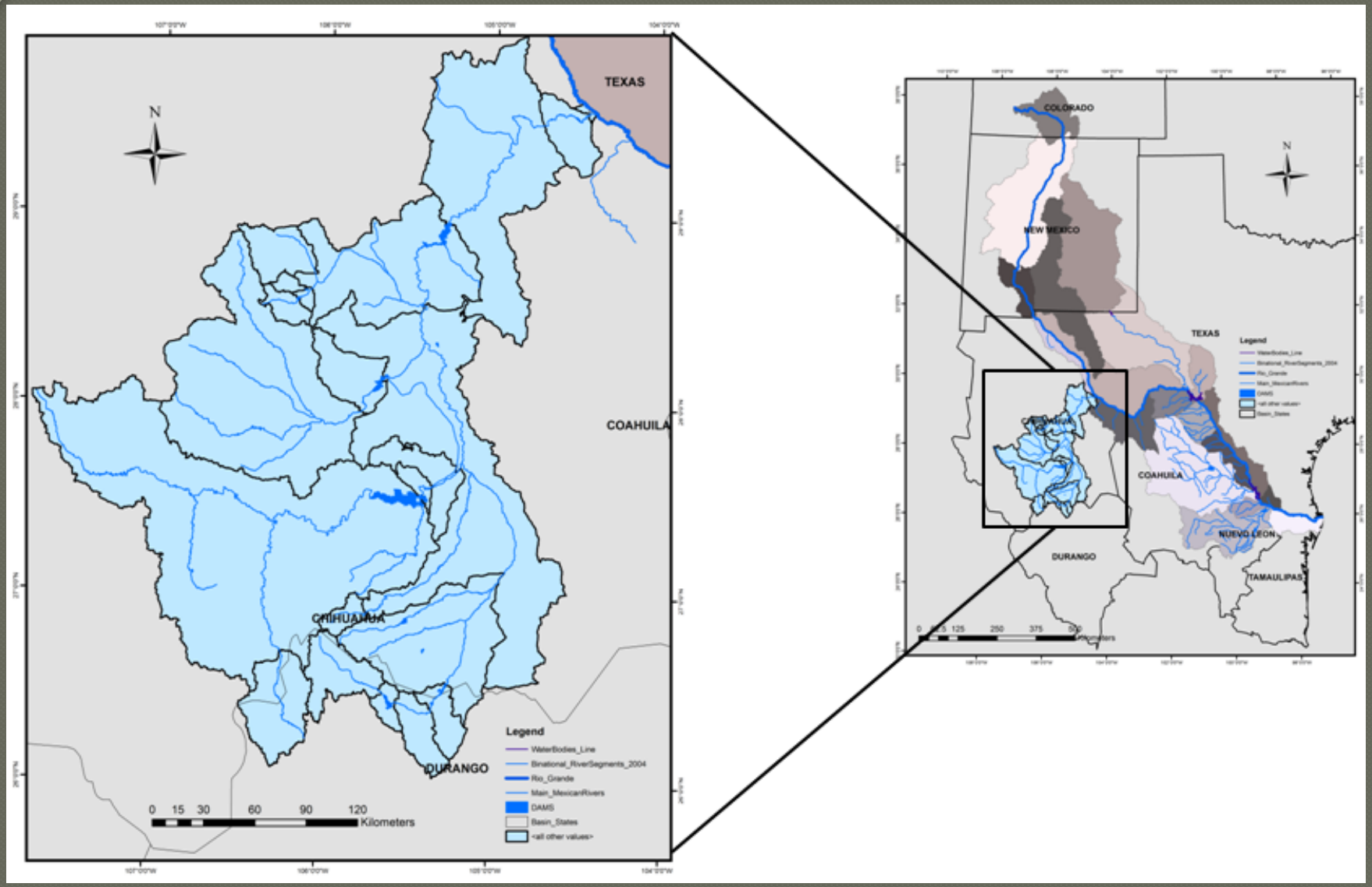
Future Border Area Projects



Rio Conchos-Ojinaga
Matamoros

El Granero Reservoir in Lower Río Conchos

US-Mexico Border 1920s
The END



Location of the Rio Conchos Basin